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Prey of the Spotted Eagle-Owl *Bubo africanus* in the Awash National Park, Ethiopia

by

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Introduction

The Spotted Eagle-Owl *Bubo africanus* is a frequent nocturnal raptor distributed over most of Sub-Saharan Africa. It occurs in a variety of habitats ranging from desert to high forest, but shows preference for rocky country (Macworth-Praed & Grant, 1957). A number of pellet analyses have shown that the composition of its food is highly variable, consisting mainly of mammals but sometimes including substantial amounts of invertebrate prey (Benson, 1962; Carnegie, 1961; Nel, 1969; Niethammer, 1975; Siegfried, 1965). Arthropod prey is important for the Spotted Eagle-Owl at localities where mammals are apparently scarce (Demeter, 1981). This owl has been found to take prey small in size relative to those captured by its close congeners, e.g. *B. capensis* in Africa (Gargett & Gorbler, 1976) and *B. bubo* in the Palaearctic (Jánossy & Schmidt, 1970).

Bubo africanus occurs frequently in the more arid parts of Ethiopia in open grassland (Urban & Brown, 1972). There is no published account of its food in this country, which has a highly distinctive, rich small mammal fauna (Largen et al., 1974; Yalden et al, 1976). It was therefore with considerable interest that I analysed a collection of prey remains of this species from Ethiopia.

Material and Method

The collection site

The Awash National Park, Ethiopia's premier wildlife sanctuary was visited by the author in the course of a 3-month zoological collecting trip in 1980 (Demeter, 1982). The northern part of the park was toured on 9 November to search for lava blister caves that have been reported by Corbet & Yalden (1972) and Hill & Morris (1971) to contain deposits of mammal bones. A Spotted Eagle-Owl was flushed from a cave formed by a lava bubble hardened in a dome shape, which stood about 4 m above the level of the flat, arid area west of Mount Fantalle, known as Sabober plains (08° 54' N 39° 56' E). The plains lie at an altitude of 1000 m, a rugged country of volcanic rubble

and thin steppe grassland with few thorny bushes of *Acacia*. The area is also badly overgrazed by livestock of local tribesmen. The bubble was neatly perforated at the top to give a small, crater-like formation about 10 m in diameter at the rim. A few intact pellets and a large number of skeletal remains were swept from the bottom of the cave. The litter of bones was confined to a spot few square meters in area, next to the circular wall of the cave. The size and the shape of the pellets, as well as the rocky character of the roosting site were typical for *B. africanus* and it was assumed that all the small mammal remains found there had been the prey of this species. Large numbers of skeletal remains of mammals were found by the Great Abbai expedition to Ethiopia in caves in Awash (Corbet & Yalden loc. cit.; Hill & Morris, loc. cit.), but they were attributed to have originated either from carnivores carrying prey back to their dens, or to the caves perforated at the top acting as pitfall traps. The back-sloping wall of the cave and the height of the rim made the cave in question certainly unnegotiable to carnivores, and the dome was raised so much above the level of the plains as to have most unlikely acted as pitfall trap for small mammals; therefore the above-mentioned alternative explanations as to the origin of the remains were dismissed.

Analysis

The collection of skeletal remains was sorted and counts of the more or less intact crania and the higher number out of the separate counts of the left and right maxillae were totalled for all species of mammals except bats. For most of the species counts of the left and right maxillae were in good agreement, therefore it seems reasonable to assume that most of the remains have been recovered from the dusty floor of the cave. Because of lack of comparative material, no attempt was made to identify the avian remains even to the ordinal level.

Results

Table 1 contains the results of the analysis of prey remains. The majority of the prey consisted of mammals; *Tatera robusta, Arvicanthis somalicus, Crocidura fuscomurina* and *Gerbillus pusillus* were captured in large numbers by the owl. Avian prey consisted mainly of passerine-like birds. Nocturnal geckos were taken in much larger number than the diurnal agames.

The non-vertebrate component of the prey was made up of Coleoptera only, most of them being scarabid beetles. The relative importance of the various food items by mass was calculated only for the mammal subtotal of the prey because the non-mammalian prey have been identified only to the higher taxa. However, the relative importance by mass of the other items was also probably small in comparison with the mammalian component.

Within the mammal component and probably within the total composition of the prey, two species of rodents, *Tatera robusta* and *Arvicanthis somalicus* accounted for over three-quarters of the total mass of the prey. Shrews were taken in large quantities, over 20 % of the total prey by number, but most of the species were small, therefore their total contribution to total mass was only about 5 %.

Notes on mammalian prey[1])

Altogether 7 species of *Crocidura* have been identified among the remains. By far the most frequent species was *Crocidura fuscomurina* (Heuglin, 1865). The taxonomic status of this species has been discussed by Hutterer (in press, a); *fuscomurina* has priority over *bicolor,* a previously widely applied name. Yalden et al. (1976) recorded 2 specimens under the name *bicolor* from the Awash National Park. The next most common species, *C. fulvastra* (Sundevall, 1843) has been recorded from Awash as *C.* cf. *sericea* by Corbet & Yalden (1972). The status and identification of *C. fulvastra* has been discussed by Hutterer (in press, b). Yalden et al. (1976) thought that the specimens referred by Corbet & Yalden (1972) as *C.* cf. *somalica* might in fact belong to *C. somalica,* which indeed was found in some numbers in the pellets. Ethiopian records of the species have been reviewed by Hutterer (1981). Four other species of *Crocidura* were found to be represented in the material by one or two skulls, of which three proved to be new records for Ethiopia. *Crocidura flavescens cinereoaenea* (Rüppell, 1842) has been recorded from Awash by Corbet & Yalden (loc. cit.). Of the species newly recorded, the taxonomic status of *Crocidura* cf. *viaria* (I. Geoffroy, 1843) is discussed by Hutterer (in press, b); the two skulls from Awash extend the known distribution of the species from the Sudan and Kenya to Ethiopia. *C.* cf. *lusitania* Dollman, 1915 probably occurs in the whole Sudan zone, but there is no recent review of the species available (see Heim de Balsac & Meester, 1977). Also first recorded from Ethiopia is *Crocidura pasha* Dollman, 1915 which occurs in the Sudan and elsewhere in the Northern Savanna.

A total of 10 specimens belonging to 6 species of bats were found among the remains, which is not surprising since the lava blister caves in Awash are known to provide roosts for large colonies of bats. *Myotis tricolor* is first recorded for the national park, in addition to the list of 16 species of bats known so far from the region (Largen et al., 1974).

Corbet & Yalden (loc. cit.) considered specimens of *Gerbillus* from Awash to belong to *G. hardwoodi,* a species Roche (1975) considered as distinguishable from *G. pusillus.* The skulls from the cave had a mean upper tooth-row length of 3.5 mm (range 3.2–3.65 mm), smaller than the same measurements of *G. hardwoodi* from Kenya given by Hollister (1919).

Only 9 more or less intact skulls of *Praomys* were found among the remains, most of the material consisted of separate left and right maxillae. The taxonomic status of the East African forms of the genus is very unsatisfactory, which made identification of the fragmented material highly doubtful. A series of 23 specimens including some with well-worn teeth have a mean

[1]) Notes on *Crocidura* by R. Hutterer

upper tooth-row length of 4.7 mm (range 4.4–5.0 mm), just about the figures Yalden et al. (1976) gave for *P. fumatus*. Few skulls have intact mesopterygoid fossae, but in at least some of these specimens the fossa is relatively wide and the palate is relatively broad, as in *P. fumatus*. At least 2 skulls, however, have broader molars and a narrow mesopterygoid fossa, characters by which the *Praomys (Mastomys)* species complex is said to be

Table 1: *Bubo africanus* prey analysis from remains found in the Awash National Park.

Prey species	total no.	% no.	estimated mass (g)	total mass (g)	% mass
Mammals					
Crocidura flavescens	2	0.13	30[a]	60	0.09
C. cf. *viaria*	2	0.13	25	50	0.08
C. fulvastra	94	5.92	11	1 034	1.63
C. somalica	17	1.07	8	136	0.21
C. fuscomurina	227	14.29	3	681	1.07
C. cf. *lusitania*	1	0.06	2	2	0.01
C. pasha	1	0.06	2	2	0.01
Rhinopoma hardwickei	1	0.06	11[d]	11	0.02
Taphozous perforatus	2	0.13	23[a]	46	0.07
Nycteris thebaica	2	0.13	15	30	0.05
Rhinolophus fumigatus	2	0.13	17[a]	34	0.04
Asellia tridens	4	0.25	23	92	0.14
Myotis tricolor	1	0.06	10[d]	10	0.02
Tatera robusta	429	27.03	92[a]	39 468	62.25
Gerbillus pusillus	157	9.80	26[e]	4 082	6.37
Mus tenellus	35	2.20	11[f]	385	0.61
Praomys spp.	41	2.58	36[a]	1 476	2.35
Acomys cahirinus	57	3.59	41[a]	2 337	3.69
Arvicanthis dembeensis	16	1.01	86[a]	1 376	2.17
A. somalicus	288	18.14	37[a]	10 656	16.83
Steatomys sp.	28	1.76	33[b]	924	1.46
Heterocephalus glaber	1	0.06	35[c]	35	0.06
Lepus habessinicus (juv.)	1	0.06	500	500	0.79
Mammal total	1 409	88.75	—	63 425	100.00

[a]) Demeter & Topál (in press), [b]) Swanepoel & Schlitter (1978), [c]) Jarvis (1978), [d]) Kingdon (1974), [e]) data for *G. pusillus* were not available, figure refers to *G. gerbillus*, [f]) figure refers to *M. mahomet* (Demeter & Topál, in press).

Table 1 (continued)

Prey species	total no.	% no.			
Birds	45	2.83			
Reptiles					
Agamidae spp.	4	0.24			
Gekkonidae sp. 1	26	1.64			
Gekkonidae sp. 2	15	0.94			
Gekkonidae sp. 3	2	0.13			
Amphibians	4	0.25			
Vertebrate total	1 501	94.52			
Insects — Coleoptera					
Thermophila sp.	1	0.06			
Hydrous sp.	1	0.06			
Buprestidae sp.	1	0.06			
Trachyderma sp.	1	0.06			
Scarabaeidae (Bolbocerinae) sp.	1	0.06			
Bolboceras sp.	16	1.01			
Aphodius sp.	1	0.06			
Scarabaeus sp. 1	23	1.45			
Scarabaeus sp. 2	9	0.57			
Scarabaeus (Kheper) sp.	1	0.06			
Heliocopris sp. 1	6	0.88			
Heliocopris sp. 2	1	0.06			
Copris sp.	15	0.94			
Onthophagus sp.	1	0.06			
Onitis sp.	1	0.06			
Oryctes boas	2	0.13			
Cerambycidae (Prioninae) sp.	1	0.06			
Cerambycidae (Lamiinae) sp.	1	0.06			
Total	1 588	100.00			

recognizable. *Praomys natalensis* has been recorded from Awash by Corbet & Yalden (1972). A series of Ethiopian forms referable to *Praomys (Mastomys)* have a range of upper tooth-row lengths 4.8 to 5.35 mm, with the width of the mesopterygoid fossa being extremely variable (Demeter & Topál, in press). In a series of *P. fumatus* from Langano, the tooth-row lengths ranged

from 4.35 to 5.0 mm, with the mesopterygoid fossa being constantly wide, therefore some of the Awash skulls could be referred to *Praomys fumatus,* but final decision should be deterred until such time as the status of the various East African forms has been clarified. *P. fumatus* is likely to occur in Awash for several reasons. Firstly, the park lies well within the boundaries of the known distribution of the species in Ethiopia. Secondly, *P. fumatus* is known to be associated with gerbils (Yalden et al., loc. cit.), which were found in large numbers among the prey. Thirdly, this species is restricted to rocky habitats; the rugged, northern part of Awash and the slopes of Mount Fantalle abound in such habitats.

Corbet & Yalden (1972) tentatively referred specimens of *Acomys* from Awash to *A. dimidiatus.* Though fairly large, the Awash skulls have oval-shaped zygomatic arches when viewed dorsally so they have been assigned to *A. cahirinus* which is, by the way, the only larger member of the genus recognized in Ethiopia by Yalden et al. (1976).

Cranial remains of *Arvicanthis* from the Awash caves have been analysed using multivariate techniques by Demeter (in press); the sympatric occurrence of the two species, first documented by Corbet & Yalden (loc. cit.) was confirmed, though *A. dembeensis* is apparently smaller in size in Awash than elsewhere in the Ethiopian Rift Valley.

The genus *Steatomys* had previously been known in Ethiopia only from a single record obtained at the southern border of the country (Yalden et al., loc. cit.). Four incomplete crania plus 24 left and 24 right separate maxillae have been recovered from the skeletal remains which were not allocated specifically since the status of the East African forms of the genus is in an extremely confusing state (Swanepoel, pers. comm.). Yalden et al. (1976) considered the single record, which happened to be the type of *Steatomys parvus* Rhoads, 1896, to be synonymous with *S. pratensis* Peters, 1846, but this action was later criticised by Swanepoel et al. (1980) who followed Coetzee (1977) in recognizing *parvus* to be specifically distinct from *pratensis.* The taxonomic status of the West African members of the genus has been clarified (Swanepoel & Schlitter, 1978). Three species of *Steatomys* have been described from the Sudan (Setzer, 1956), two of which are known from the types only. One of the types, *S. aquillo* Thomas & Hinton, 1923 has the skull badly broken and is therefore incomparable with the present specimens. The following useful measurements were taken from the Awash skulls: alveolar length of upper molar row 4.2 mm (range 4.0–4.4 mm), least interorbital constriction 4.0 mm (3.8–4.2 mm), anterior palatal foramen 5.4 mm (4.8–5.8 mm). These measurements are appreciably larger than those for *Steatomys parvus,* so the specimens from Awash certainly represent a species different from the one already known for the country. The skulls are somewhat comparable in size with *Steatomys gazellae* Thomas & Hinton, 1923,

though the latter has the length of the upper molar row and the width of the interorbital constriction above the maxima found in the Awash skulls. Awash lies about 600 km from the type locality of *S. parvus* and the nearest known localities of the genus in the Sudan are at a distance of about 800 km. This gap in the known localities may or may not represent genuine geographical isolation of the Awash form, since these small rodents are notoriously difficult to collect. Specific assignment of the specimens from the prey remains must await the conclusions of a satisfactory review of the genus in East Africa.

Discussion

There is only one previous complete analysis of the food of any species of owl in Ethiopia. Yalden (1973) analysed pellets of *Asio abyssinicus* from the Bale mountains. The genus *Megadendromus* was described from a series of specimens some of which were found in pellets of an unidentified species of owl (Dieterlen & Rupp, 1978).

The composition of the food of *Bubo africanus* in the Awash National Park consisted mainly of mammals. The arid region supports rodent populations sufficiently large for the owl to prey mainly on mammals, especially on *Tatera* and *Arvicanthis,* and take other prey only in insignificant numbers. In Nigeria, *B. africanus* was found to prey mainly on *Tatera* and *Taterillus* in a woodland savanna, but in a locality severely degraded by annual burning, the owl took mainly scorpions, beetles and reptiles, and the only rodent found in the pellets was *Taterillus* (Demeter, 1981). In the Namib Desert, with a rich small mammal fauna, the Spotted Eagle-Owl preyed mainly on rodents (Nel, 1969).

Four species of mammals are first recorded here for the whole of Ethiopia, and additional two for the Awash National Park. Further studies based on pellet material should be pursued and it is anticipated that many new locality data could be obtained by doing so and then, with larger material available for study, it would be possible to reach taxonomic conclusions about the status of many of the rarer species.

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Summary

The prey composition of *Bubo africanus* is reported as determined by analyses of prey remains from a roosting site in the Awash National Park of Ethiopia. Mammals accounted for 88 % of the total number of prey items, in particular *Tatera robusta, Arvicanthis somalicus, Gerbillus pusillus* and *Crocidura fuscomurina* were the most frequent prey. By mass *Tatera robusta* and *Arvicanthis somalicus* made up over 60 % of the total mass of mammalian prey. *Crocidura* cf. *lusitania, C.* cf. *viaria, C. pasha* and *Steatomys* sp. are first recorded for the whole of Ethiopia. In addition to these, *Myotis tricolor* and *Praomys* cf. *fumatus* are first recorded for the Awash National Park.

Zusammenfassung

Es wird über das Beutespektrum der Eule *Bubo africanus* im Awash Nationalpark in Äthiopien berichtet. Dazu wurden Beutereste aus einem Nestplatz analysiert. Säuger bildeten 88 % der Gesamtzahl von Beuteresten, am häufigsten waren *Tatera robusta, Arvicanthis somalicus, Gerbillus pusillus* und *Crocidura fuscomurina*. Die zwei Ratten *Tatera robusta* und *Arvicanthis somalicus* machten 60 % des Gesamtgewichtes an Säugern aus. *Crocidura* cf. *lusitania, C.* cf. *viaria, C. pasha* und *Steatomys* sp. werden erstmals für Äthiopien nachgewiesen, *Myotis tricolor* und *Praomys* cf. *fumatus* erstmals für den Awash Nationalpark.

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